MISSOURI BOTANICAL GARDEN BULLETIN

olume XLIV December, 1956 Number 10

"Delightful scientifick Shade!
For Knowledge, as for
Pleasure made."

From a poem on the Oxford Botanic Garden, published in 1713 in a book, *Vertumnus*, by Abel Evans.

CONTENTS

"How Can I Save My Poinsettia Plant?"
Dr. George T. Moore, Director 1913–1953
The Lippagator Method of Plant Propagation
Horticultural Courses for Spring 1957
Personal Memories of Mr. Shaw
Why Botanists Visit Math Departments
Notes
Villa Aldobrandina Tusculana—A Gift to Garden Library
General Index, Volume XLIV

Notice: There will be no January BULLETIN. In 1957 the BULLETIN will be published in February, March, April, June, September and October.

THE question most frequently asked the Garden in December is *"How can I save my poinsettia plant?*

Commercial growers produce poinsettias for Christmas by starting new plants from cuttings in early summer; but if you want to save your plant for next year, the Garden recommends the following procedure. After the plant has lost its leaves, store it in a cool place until May. Do not water it. In May, cut the stems back to six or eight inches above the rim of the pot. Shake some of the soil from the roots and repot, using good garden soil, into a six- or seven-inch pot, which has a piece of broken pot placed over the hole in the bottom. After the poinsettia has been repotted, water it, then put it outside in a sunny place with the pot set into cinders or gravel to a depth of about three inches. Within a few weeks several shoots will appear, two or three of which should be kept and the others removed. These branches will grow quite tall in one season and must be tied to a support, preferably a bamboo cane. The plants may be started in June and even early July. Although late planting will prevent the poinsettias from growing too tall, weak plants that have been kept dormant too long often fail to grow. The pots should be lifted occasionally to prevent large roots from growing through the hole of the pot into the soil beneath, for the severing of the main root will cause the leaves to drop when the plant is taken inside in the fall.

Cover: Dr. George T. Moore

Missouri Botanical Garden Bulletin

VOLUME XLIV

1956

ST. LOUIS, MISSOURI

PUBLISHED MONTHLY EXCEPT JULY AND AUGUST,
BY THE BOARD OF TRUSTEES

SUBSCRIPTION PRICE: $2.50 A YEAR

Missouri Botanical Garden Bulletin

Vol. XLIV DECEMBER, 1956 No. 10

DR. GEORGE T. MOORE, DIRECTOR 1913–1953

On the evening of November 27th Dr. Moore died at his home in the Garden grounds, thus bringing to a close almost half a century of service to this institution. He came to St. Louis in 1909 at the age of 38, already well known as a brilliant teacher and investigator, who at the very outset of his professional career had solved the problem of controlling effectively those microscopic plants which can be so obnoxious in public water supplies.

St. Louisans knew Dr. Moore as a skillful administrator, an effective participant in many civic enterprises, a polished and witty master of ceremonies on many public occasions . . . but he was much more than this. His brilliant research has already been mentioned. He was closely connected with building up the Marine Biological Research Station at Wood's Hole, Massachusetts, into a national biological research center and he kept up this work after moving to St. Louis. Until after World War I, he taught one of its outstanding summer courses every year and many of the country's top flight biologists received part of their training under his sharp eyes. Through the twenties and thirties he maintained his summer home in Woods Hole and continued as an effective influence in national scientific affairs there and elsewhere. During his early years in St. Louis he taught both graduate and undergraduate courses in the Henry Shaw School of Botany. He was most effective as a teacher; the few students who carried on graduate work under his personal direction have all had distinguished careers.

In 1913 he was made Director. Under his supervision the Garden was rapidly rebuilt. Then as now its greatest problem was rising operating costs, particularly labor costs. These were greatly reduced by redesigning the entire garden. Inefficient old greenhouses were replaced by new ones, the elaborate and time-consuming flower beds of Mr. Shaw's day were streamlined or eliminated altogether. Outstanding scientists were added to the staff, special fellowships were offered to graduate students in botany and the herbarium was rapidly expanded.

After World War I the Garden again faced the problems which rising prices bring to endowed institutions. They were met for the time being by getting court permission to sell enough Garden property to acquire the Gray

Summit Arboretum and to build a set of orchid greenhouses.

For the last half of his directorship, Dr. Moore's first concern was the attempt to raise the large endowment necessary to keep the Garden on the course charted by Henry Shaw. His annual reports were eloquent, yet his own operating finesse kept the community at large from realizing the Garden's increasingly urgent needs. He retrenched as skillfully as he advanced. All work in Plant Physiology and considerable portions of the library were gradually transferred to Washington University. Mechanized equipment replaced hand labor. Elaborate displays such as the Iris garden requiring many man-hours per year were replaced by smaller ones. Yet through all these strategic retreats he kept up his morale, as well as that of his staff, and as late as 1946 was having architects draw up detailed plans for a new herbarium building.

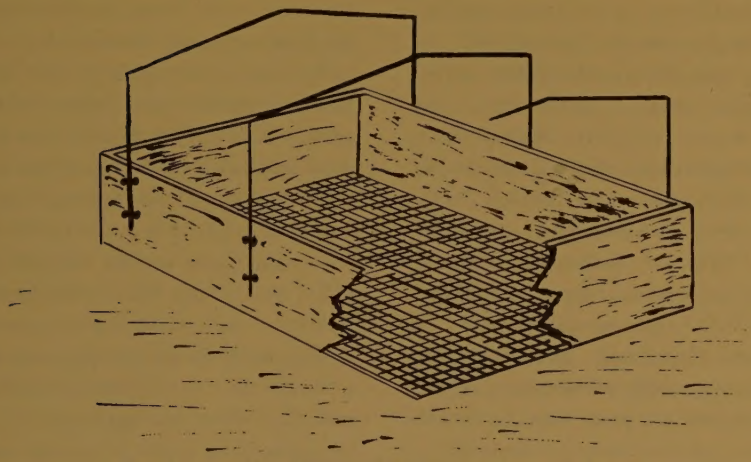
To those who knew him well, he was generous, warm-hearted, and a master at kindly repartee. Outwardly, he maintained a dignified reserve, yet, behind the curt nod, there was always the twinkle in the eye; an innate kindliness softened the firm lines around the mouth. Many a student or staff member suddenly faced with overwhelming personal or professional problems found his burden lightened by Dr. Moore's quick perception, human understanding, and vast common sense.—E. A.

THE LIPPAGATOR METHOD OF PLANT PROPAGATION

HELMUT TUTASS

In recent years, methods of vegetative plant-propagation have developed, which are superior to those practiced in the past. One which has proved to be especially valuable to the gardner whose greenhouse is the living-room, kitchen, or basement, involves the use of the "lippagator" (named for Mr. Louis Lipp of the Holden Arboretum near Cleveland, who promoted the use of this method of plant propagation). The lippagator is a flat box filled with a loose rooting mixture and covered with a plastic sheet supported by a frame. Such a box can be built easily at low cost and has been used successfully in homes as well as here at the Garden.

To build a lippagator (see sketch), use a greenhouse flat or a box approximately 21 inches long × 15 inches wide × 6 inches high, made of wood or a light-weight metal. In the bottom drill holes, one-half inch in diameter, about three inches apart, to provide the necessary drainage. If a wooden box is used, the bottom can be made of wire screen—quarter-inch mesh is good for most rooting mixtures (sand may require a finer mesh). Good drainage is essential to prevent the water from becoming stagnant and the cuttings from rotting. For the frame, use any wire which is strong enough to support the weight of the plastic sheet and which can be bent easily into the form illustrated. The distance from the bottom of the box to the highest point of the frame is about 14 inches; the outer edges should be 1 to 2 inches lower so



Sketch of wooden lippagator box with wire screen bottom

that the water which condenses on the inside of the plastic can run down the sides, instead of dripping on the cuttings, causing them to rot. The plastic should be large enough to cover completely the top and sides, with margins wide enough to be folded beneath the box and held by its weight. Since the plastic holds moisture and thus maintains a high humidity, yet is porous enough to permit such gases as oxygen and carbon dioxide to pass freely, it creates in the lippagator a microclimate which has proved favorable for root growth.

A good rooting mixture can be made with peat moss mixed with equal parts of one of the following: styrofoam, permalite, or medium-coarse sand, washed; all of which can be obtained at a garden supply store. Put a 4-inch layer of one of these mixtures into the lippagator box and sprinkle it thoroughly with water. Into this loose mixture, insert the cuttings. If the cuttings are from several kinds of plants, differing in their rooting habits, it is best to keep the different kinds in separate pots or pans, filled with the rooting mixture, which can be set in the lippagator box. This will allow removal of plants that are well-rooted without disturbing those less well-developed. Furthermore, if rooted in separate pots, the cuttings will not need transplanting when they are taken from the lippagator; but rather, they can be removed undisturbed in the pot and, therefore, can better withstand the change to the more normal climate of the greenhouse or livingroom.

Rooting hormones can be used to speed up root development on plants known to respond favorably to their influence; however, for those plants whose response is not known, the use of hormones should be avoided, since they may have an injurious effect.

After the cuttings have been placed in the lippagator, cover the frame and box with the sheet of plastic, tucking it under the edges in such a way that one end can easily be lifted as a window to check on the progress of root-

ing. Additional water may not be necessary for weeks; however, if the bedding material becomes dry, water thoroughly, using a gentle spray and warm water (slightly higher than room temperature). Cold water shocks plants—the yellow leafspots on African Violets, for example, are well-known signs of such mistreatment. The lippagator should be kept at about 60° to 75° F. (room temperature) in a bright place, but not in direct sunlight, especially in summer. Good locations are an east, west or north window in the house in winter and in the shade of a tree in summer.

As soon as the cuttings have rooted, they can be removed from the lippagator. They wilt slightly for a few days until they become acclimatized to the conditions of the open air. If but one kind of plant is put into the lippagator, the cover can be removed gradually, permitting the plants to adjust slowly.

This method of propagating plants is simple to use; it requires little care, and the results are excellent.

HORTICULTURE COURSES FOR SPRING 1957

THREE courses in Horticulture will be offered by the Garden in the Spring of 1957. Two of these, Plant Propagation and Spring Horticulture, will be conducted in the Experimental Greenhouse at the Garden; the third, Growing Orchids in the Home, will be a single, full-day session at the Orchid Range of the Garden Arboretum, Gray Summit, Missouri.

One of the best ways to learn to garden effectively is to exchange information and plant materials with other amateur gardeners. A good feature of these courses is that they bring amateurs together in an informal way, enabling them to learn from each other as well as from their instructors.

As materials for the courses are purchased immediately after the closing registration date, no registration fees can be refunded after the last day of registration. Please send registration fees to:

Horticultural Courses,
Missouri Botanical Garden,
2315 Tower Grove Avenue,
St. Louis 10, Missouri.

COURSE III—PLANT PROPAGATION

Instructor: F. G. Meyer

Four sections (each with two periods of instruction). Limited to 60 persons (minimum of 10 per section).

Place: Experimental Greenhouse, Missouri Botanical Garden. Enter Cleveland Avenue gate, 2221 Tower Grove Avenue.

Schedule: Section I—
Friday afternoons, January 18, 25, 1:00–4:00 P. M.

Section II—
Saturday mornings, January 19, 26, 9:00 A. M.–12:00 Noon.

Section III—
Wednesday afternoons, January 30, February 6, 1:00–4:00 P.M.

Section IV—
Saturday mornings, February 2, 9, 9:00 A. M.–12:00 Noon.

Content of Course:

Discussion of the principal methods of propagating plants by vegetative means: root cuttings, suckers, division, crowns, hard- and soft-wood stem cuttings, summer wood cuttings, offsets, layering, scales, tubers.

Display of various propagating methods.

Rooting plants under mist.

Rooting plants under plastic (the "Lippagator").

Air layering.

Two practice sessions in greenhouse, making cuttings.

One Lippagator (plastic-covered propagating box) given to each student.

At least 50 kinds of plants per student (house plants, broad leaf evergreens, etc.).

Registration (by phone or mail): December 15 to January 14, Fee—$10.00 (includes all materials).

COURSE IV—SPRING HORTICULTURE

Instructor: Members of the Garden Staff

Four sections (five periods of instruction). Limited to 85 students.

Place: Experimental Greenhouse, Missouri Botanical Garden. Enter Cleveland Avenue gate, 2221 Tower Grove Avenue.

Schedule: Section I—

Friday afternoons, 1:00–4:00 P. M. March 22, 29, April 5, 12, 26

Section II—

Monday afternoons, 1:00–4:00 P. M. March 25, April 1, 8, 22, 29

Section III—

Wednesday afternoons, 1:00–4:00 P. M. March 27, April 3, 10, 24, May 1

Section IV—

Saturday mornings, 9:00 A. M.–12:00 Noon. March 30, April 6, 13, 27, May 4

Content of Course:

Five lectures, including practical discussion on soils, seed-sowing, fertilizers, liming, mulching; kinds of broad-leaf evergreens for St. Louis; pests and diseases.

Demonstration of pruning trees and shrubs.

Instructive tour of the Garden's world-famous library and herbarium.

Five sessions in the greenhouse. Each student will receive four metal seed flats with instruction in seed sowing and transplanting of summer annuals and perennials.

Plants and flats may be taken home at end of course.

There will be enough space to plant 16 kinds of seeds in seed flats. Seeds available at the greenhouse, or bring your own special kinds.

Registration (by phone or mail): February 11 to March 22, Fee—$15.00 (covers all materials, including flats).

COURSE V—GROWING ORCHIDS IN THE HOME

Instructor: R. J. Gillespie

One section (one period of instruction).

Place: Orchid Range, Missouri Botanical Garden Arboretum, Gray Summit, Missouri.

Time: April 20, 1957, 10:00 A. M. to 4:00 P. M.

Schedule and Content of Course:

10:00 A. M.
Kinds of orchids suitable for home culture (orchids that like St. Louis).
Discussion of factors influencing orchid growth and development: light, temperature, etc., for home-adapted genera only.
How these conditions can be created in the average home.
Potting demonstration. Question and answer period, if time permits.
12:00 Noon. Lunch. Garden supplies coffee and soda.
1:00 P. M. Growing Orchids in unusual containers in the home. Demonstration of potting and care.
2:00 P. M. Inspection of greenhouses.
3:00 P. M. Individual potting instruction by members of Orchid Department staff. Students may take potted plant home.

Registration (by phone or mail): March 15 to April 15, Fee—$10.00.

PERSONAL MEMORIES OF MR. SHAW

IN HENRY SHAW'S day it was the fashion to put on public celebrations with formal speeches duly reprinted in the local newspapers. In his will, a long and remarkable document, he provided special funds for formal banquets, and it is from the records of one of these banquets, held in 1892, three years after his death, that we owe our best first-hand accounts of Mr. Shaw as a merchant and a man of affairs. One of the speakers at this particular banquet was Professor J. D. Butler of the University of Wisconsin. For over twenty years he had maintained an increasingly close friendship with Mr. Shaw, visiting him repeatedly in his own home, and entertaining him in return. In the Garden's library is the original typewritten record of the entire banquet, complete even to inserts for "Laughter" and "Applause." It tells us something of Mr. Shaw's memory of Mill Hill school where he was trained as a boy and goes on in considerable detail to describe how he built up the beginnings of his fortune.—E.A.

"I was so favorably introduced to Mr. Shaw that he urged me, whenever I should be coming in this direction, to make my home with him. He told me the course of his life so that I would know whether to find him in Locust St. or in Tower Grove, and the result was that for more than twenty years I broke his bread and I have had him under my own roof breaking my bread. He loved to talk of his early days in Mill Hill. To speak of the cedar that was planted there by Linnaeus in 1736. He led me to a tree six years ago near his own ground planted by himself that was already a hundred feet high. He was pleased with a couplet that I remembered to quote,—

'A forest planted by himself he sees,
And loves the old contemporary trees.'

"He used to tell me that every

scholar at Mill Hill had a square rod of ground that he was allowed to fill in any way he chose. The child is father of the man. We see there the baby figure of a giant mass of things to come at large. He told me in our manifold conversations of his voyaging four and seventy days with his father in an old Danish prize vessel, then reaching Quebec, of business prospects there and in Montreal not flattering, of sleighriding across Vermont to reach New York, no room for him there; of a twenty-three days voyage to New Orleans, of his welcome there by an old family friend, a sugar planter, and of his half resolution to become a sugar planter, but he knew something about cutlery but nothing about canebrakes. He found that at New Orleans he was within ninety days by keel boat of St. Louis. He was about putting his baggage aboard a keelboat when a vessel, schooner rigged, arrived there from Philadelphia that had also a steam engine aboard and promised a passage in forty-five days to St. Louis. He went on board the steamer and she arrived here on time, within two years of the first steamer's arrival in this City which was in 1817, six weeks voyage from Louisville. He went up to St. Charles before settling here. Thought St. Louis too big a place for him at first. In his parlor in Locust St. he had standing the arm chair with a table leaf that he used in the days of his business. Sitting there he used to tell me of his early adventures. One of the first things he learned was that hardware was brought across from Philadelphia at nine dollars a hundred but he had ascertained that he could bring it for three dollars from Liverpool. He at once laid in a good stock of every variety of hardware and was master of the market here. As early as 1824 he obtained a contract for supplying all the hardware needed in Chicago at Fort Dearborn, and kept it for a dozen years.

"He was up to everything in aspiration, and down to everything in the drudgery of detail.

"The first time he went down the River, having observed that sugar here ran up to twenty-five cents at some time in the year, he bought a large quantity slightly damaged at two cents and brought it here for one more. It was a drug. But when he began to repent of his huge inlay of sugar a flotilla came along here with supplies for the United States posts up the River, but they had no sugar. Their barge that had it had sunk on a snag, and all the sugar to be had in St. Louis was in the hands of Henry Shaw. (Laughter and applause.)

"Is it any wonder, in view of these two or three little things that within one and twenty years he had all the money, as he thought, that any bachelor needed to have, and resolved henceforth to enjoy his fortune? It was because he had sense enough to retire that of no distemper, of no blast he died, but fell like ripened fruit that mellows on, still wondered at because he dropped no sooner. I hope every rich man here will learn by his example. (Applause.)

"I will not tell you half the things I thought of, but there is one I will mention. The Shakespearan mulberry

has become celebrated in the Garden, planted on a spot selected by Adelaide Nielson. Mr. Shaw's acquaintance with that lady began in this way. We were sitting together in the back parlor there at Tower Grove when a card was brought in from a lady asking permission to dry her feet, and that card bore the name of Adelaide Nielson. She was cordially greeted and seated herself at one side of the grate, took off her shoes and warmed her feet. I sat at the other side of the grate, Mr. Shaw between us. She was exultant just then at finishing her one hundredth impersonation of Juliet. She enjoyed our conversation all the more because we both of us had been in her native Spain.

"Many a walk did we take through the Garden. The last one we lingered at the cenotaph for Nuttal, the first botanist that explored the Arkansas; passed on, then, to the shrine of the temple and I noticed the writing on the roof and proposed the phrase 'Ignorance, the curse of God; Knowledge, the wing wherewith we fly to heaven.' 'Too many words for the shrine,' said Shaw, 'But I would gladly see it on the cornice.' We passed on, then, to his mausoleum. We had the gate opened. His statue, recumbent on the lid of the sarcophagus with the rose in its hand was there laying one side; the grave open. I said to him, 'I have lately been in Egypt and in the heart of the great pyramid have laid me down and folded my arms on the coffin of Pharaoh, and, with your permission, I will have the first use of yours.'" (Laughter and applause.)

WHY BOTANISTS VISIT MATH DEPARTMENTS

EDGAR ANDERSON

In the early summer of 1931 Sir Ronald Fisher, the great English statistician, came to visit me in St. Louis. At the very last minute St. Louis mathematicians tried to arrange a luncheon for him, an attempt which fell through because the distinguished guest-of-honor was busy making a pilgrimage to Meramec Highlands and to Kirkwood. He spent the morning out in what is now Osage Hills, looking at redbud trees on the rocky hillsides above the Frisco tracks. At the actual hour when the luncheon might have been held, he was dining informally on sandwiches and ice-cold lemonade in a screened porch at the corner of Argonne and Dixon, reminiscing happily with Mrs. Phil Rau.

Sir Ronald was not behaving capriciously; it was a pilgrimage in a very real sense. Mrs. Rau's brother, the late J. Arthur Harris, was the first staff member of the Missouri Botanical Garden to bring mathematics to the study of evolution. Early in the 1900's he made a statistical study of redbud seedpods from Meramec Highlands. Though it was a pioneer effort and contributed nothing directly to our understanding of their amazing variability it was mathematically most ingenious. Sir Ronald developed from it his widely used "Analysis of Variance".

Dr. Harris left St. Louis nearly fifty years ago and at the time of his death was a botanist at the University of Minnesota, dealing skillfully with such diverse problems as the chemistry of drought resistance in desert plants and the measurement of crop yields. Yet scarcely a working day passes, but that, by way of Sir Ronald's methods, J. Arthur Harris' bubbling originality is put to good use in our local scientific laboratories and industrial establishments. Of the hundreds of St. Louisans who in this way follow in Harris' footsteps during any one year, few indeed realize that a basic part of the sharp mathematical tool they use was forged at Shaw's Garden. Somehow, the fact that botanists are really up to such things never catches the public's imagination.

Two years before Sir Ronald's visit, one of the best science reporters we have ever had in St. Louis, Miss Edna Warren of the *Globe-Democrat*, wrote a feature article about my own first attempt to analyze evolution mathematically. She somehow waded through my dullish technical paper, with its page after page of measurements, and produced an understanding and interesting account of my four years of work with native species of Iris.

This early work led to a scholarship in England for study with Sir Ronald. I was greatly helped by the association with his sharp and original mind. Yet much as I was impressed by the good sound practical help his methods were bringing to many other fields (scoring blood counts in hospital laboratories, yield-testing of oats and wheat, the laying out of experimental plots), one fact became increasingly clear. They did not help my particular problem. To my basic quest for a measurement of species differences so efficient that one could use it in studying how evolution is actually going on right now, they had little to offer. In some phases of the work they helped; in others they gave an incomplete answer, sometimes even a wrong one.

For a good fifteen years after Sir Ronald's visit, I blundered away at the basic problem. I read, experimented, studied species in the field, the laboratory and the herbarium. Gradually I dug down to pay dirt, working out methods of putting the complicated sets of facts into exact little pictures and diagrams. In my book, *Plants, Man and Life* I have written the story of how, working through the winter of 1944 on a sunny roof-top in Mexico, I finally hammered out a new method which was half a mathematical table, half a precise picture. With it one could record and measure the differences between two Mexican corn fields with only a few hours of work and get an answer which agreed with common sense and good judgment.

Now the road was clear; I rapidly got down to fundamentals. The basic techniques were refined to the point where (to take an actual example) one could describe species he had never seen. By measuring thirty plants in one mountain meadow, a detailed technical description of another species which had once hybridized with their ancestors could be drawn up, even when one knew nothing about the flora of the region or anything at all about the species which he was predicting!

Finally in 1952 I waded into the basic problem of why statistical methods are sometimes so helpful, yet sometimes give the wrong answer. The explanation was a simple one. If the basic facts in any particular problem are numbers (let us say the yield in bushels of a series of wheat varieties) then statistics does a good job. If the basic facts are patterns (as for instance the intricate and complicated kinds of differences between two species), then at best statistics is inefficient; at the worst it gives the wrong answer but veils its failure in impressive technical language.

This was (and is) a new idea to most statisticians. Outsiders who rush in with fresh ways of looking at old problems are seldom popular. However, a few of the country's best mathematicians took a most sympathetic attitude and began to recommend these new ideas and methods, not merely to biologists, but to scholars in any field where the basic facts were patterns. This group who have brought their problems to me in the last year or so are so varied, seen as a whole, that it is almost comic to think of them arriving together at the door of a busy botanist. One was concerned with a medical study of healthy versus diseased tissues, another dealt with the problem of measuring depressed areas in our big cities. The easiest problem to solve was an analysis of basic patterns in English poetry. The one in which the new methods and insights are already of the most assistance is a large-scale attempt by a group of social anthropologists to analyze what happens when groups of men live and work closely together.

The deeper I dug, the more apparent it was that I had gotten down to something basic, something of real importance to science, to industry, something which, if we must classify it, belongs in the wide field of applied mathematics. Accordingly, for the last two years (on top of my regular duties), I have been working out the details of shifting as much of my work as possible to other shoulders and of arranging for funds to carry on my research. In odd moments in the last year I have even managed to write chapters for two books which are now in the press. One is technical. It grew out of the fact that these new methods and points of view are so useful in plant breeding that seven of my students are now highly successful plant breeders. The other is in the Golden Jubilee Volume of the Botanical Society of America. In the preparation of it, I was greatly helped by Professors Feinberg and Primakov of the Physics Department at Washington University, as well as by my mathematical friends. In as simple language as possible it discusses the area where statistics, and natural history, and applied mathematics come together.

A generous grant from the Guggenheim Foundation will allow me to take half-time leave of absence during the next year or so. I shall first be the guest of the Mathematics Department at Princeton, where I have been dropping in every six months or so for several years. I am taking along data and materials on problems that lie in the field between mathematics and bi-

ology, including one or two that were chosen because they are comparatively simple ones. It is the simplest problems which are the most rewarding when you finally see how you can get down to them—and in this case I think I do.

To me one of the most surprising things about my adventures out into the unknown has been the quick reactions of a few industrialists. Apparently in these days some American businessmen are, on the whole, more alert to new developments than are many scholars in our great universities. Before I had published a single paper on my studies of corn, one of the big corn-breeding companies had sent its research director to see me. Since that time it has supplied the money for technical assistants and graduate fellowships for use in basic research. All I did in return was to take an interest in the company's research problems and talk from time to time with the men who were carrying them on. More recently the Brewing Industry has been supporting some fundamental studies of hops in which my new methods have been strikingly successful. A former student is finding them useful in Sorghum breeding, another has applied them effectively to the baffling problem of how to pick out from the thousands of kinds of beans in Central America, the dozen or so which are best to breed from. This summer the American director of a coffee-breeding project in Ethiopia came to work with me and I hope world conditions may permit me to work with him there within the next year. Two other students are now working in the South Pacific on the classification and improvement of native crop plants. All of these projects bring in at least enough money to carry on the work and sometimes a little more. At a time when the Garden is hard-pressed financially, they are making it possible to build up our Museum of Useful Plants into an internationally significant center.

NOTES

DURING October and November, two scientists interested in the flora of Mexico worked for extended periods in the Garden library and herbarium. Dr. Ida Langman of the Philadelphia Academy of Natural Sciences staff has been working for some years on a comprehensive bibliography of Mexican botany. Her stop-over here en route to Mexico was mutually profitable. She was able to locate a number of references here not available elsewhere and to consult with the staff about various details of her trip to Mexico. On the other hand she helped several of us who were puzzling over obscure references and departed for Mexico City with a long list of scientific errands to carry out for us there. Ing. Efriam Hernandez Xolocotzi, an authority on both the native flora and the varieties of cultivated plants of

From "Villa Aldobrandina Tusculana", a book of etchings by Dominique Barriere depicting the famous Villa Aldobrandina in Tusculum near Rome. This magnificent old garden book, published in Rome in 1647, was recently presented to the Garden library by **Mr. Henry Putzel.**

Mexico, has been closely associated with the basic agricultural research and plant breeding program carried on in that country by the Rockefeller Foundation and the Mexican Government. He is now in this country for a year's work on the range grasses of Mexico. During his few weeks at the Garden he worked in the library and the grass herbarium, and consulted with members of the staff. Dr. Alfredo Cocucci, of the University of Cordoba, Argentina, is here for a year's study and work in the herbarium on the annual assistantship provided by the National Science Foundation to release Dr. Rolla Tryon from routine curatorial duties. Dr. Tryon's *Fern Flora of Peru* continues to go forward under the sponsorship of the National Science Foundation. He and his wife, Dr. Alice Tryon, who is assisting him in this work, returned from Peru the last week in November. They report an interesting and profitable visit spent partly in the field and partly in working with Peruvian scientists in their own institutions. Dr. Tryon's Flora will be the first complete consideration of the ferns of any large tropical area.

Of the staff and students at the Garden during the last few years, the following have received new appointments: Dr. Reino O. Alava, formerly Rosarian at the Garden, is now in the department of botany, University of California, Berkeley.

Dr. Harold Kidd is at the Pioneer Hi-Bred Corn Company experiment station at Manhattan, Kansas. Dr. Edward L. Davis, who studied hops under a special fellowship from the Brewing Industries, has returned to the University of Massachusetts, Amherst, where, in addition to teaching, he will continue his research on hops. Dr. Lawrence Kaplan, who completed his graduate work at the Garden under Dr. Hugh C. Cutler and received his degree from the University of Chicago in June, is professor of Biology at Wright Junior College, Chicago. Dr. A. S. Rao, who studied the genus Rauvolfia under a fellowship from Ciba Pharmaceutical Products Inc., has taken a position in the botany department at the University of Toronto, Toronto, Canada. Dr. Ding Hou, who last year assisted in the publication of a Flora of China at the Arnold Arboretum of Harvard University, has accepted an appointment in Leyden, Holland to work with van Steenis on the Flora of Malesiana. Word has been received that Dr. Nalini Nirodi is now on the staff of the Indian Agricultural Research Institute, New Delhi, India. The herbarium assistant during 1955-56, Mr. George Eiten, has returned to the New York Botanical Garden where he will continue work toward his doctorate. Dr. Bernard Mikula is at Madison, Wisconsin, in the botany department of the University of Wisconsin.

A graduate student from Claremont College, California, Mr. Calaway H. Dodson, is completing a four months' study of the orchid collection as a part of his research under a scholarship grant from the Garden Clubs of Missouri.

GENERAL INDEX

Figures in *italics* refer to page numbers of illustrations.

A

Acidity in soil, for growing azaleas, 53
Adreon, Isabel: Borage, 80
African Violet, 137; Society of America, history of, 137; clubs in St. Louis, 138
Ahahuete, at "Bosque del Contador", *20*
Ahuehuete, in Chapultepec, Mexico, *23*
Alava, Dr. Reino O., 153
Alfalfa, 124
Alley Springs, in the Missouri Ozarks, *3*
Aluminum sulphate, for azaleas, 51
Anderson, Edgar: Bald Cypresses for St. Louis, 109; Dr. George T. Moore, Director 1913–1953, 141; In Memoriam, Benjamin Minge Duggar, 114; Korean Lespedeza, 124; Missouri Vegetation and an English Mathematician, 12; Plants for a Hot Place near a Wall, 128; review of Geddes' "Cities in Evolution", 91; review of Li's "Chinese Flower Arrangement", 111; Rose of Brody: an Outstanding New Daffodil, 119; Why Botanists Visit Math Departments, 148
Anderson, Dorothy: Thyme, 93
Annuals and biennials, wild, Missouri's crop of, 41
Anthriscus cerefolium, 75
Artemisia dracunculus, 70
Azalea indica, 60; *ledifolia alba*, 59, 60; *rosmarinifolia*, 60
Azaleas, diseases of, 51; feeding, 57; fertilizers for, 31; for St. Louis, 49; growing from seed, 61; hybrids, 59: Exbury, 61, Gable, 60, *April cover*, Glen Dale, 61, Mollis, 50, *56*; locations for, 53; mulching, 53; native in Missouri, 102; pruning, 57; seedlings of, four months old, *63*; seedlings of, in a coldframe, *62*; soil for, 51; species, 59; watering, 57
Aztec and pre-Aztec gardens, 17

B

Baer, Mary E.: Flowers for a Fragrant Pot Pourri, 75; The Dry Method of Making Pot Pourri, 76
Bald Cypress at Santa Marie del Tule, Mexico, *26*; in Tower Grove Park, *108*; for St. Louis, 109
Balkan Holly *(Ilex aquifolium* var. *angustifolium)*, 32
Barbre, Clarence: Review of Pirone's "What's new in Gardening", 88
Baron, Edith: Pomanders, 77
Basil, *94*, 95, 105
Bergamot, 69
Biennials, 42; Missouri's crop of, 41
Big Springs, *134*
Blank, Jane P.: Herb Vinegars, 72
Bluegrass in St. Louis, 96
Book Reviews: Cutak's "Cactus Guide," 126; Geddes' "Cities in Evolution," 91; John and Carol Grant's "Garden Design, Illustrated," 90; Li's "Chinese Flower Arrangement," 111; Muenscher's "Weeds," 47; Pirone's "What's New in Gardening," 88; Rosendahl's "Trees and Shrubs of the Upper Midwest," 123; Watkins' "ABC of Orchid Growing," 127; Well's "Plant Propagation Practices," 14
Borage, 80
Borago officinalis, 80
Bosque del Contador, ahahuetes at, 20; description of, 27
Botanical gardens: definition of, quotation from C. Stuart Gager, 29; in ancient Mexico, 17; of Missouri (see Missouri Botanical Garden)
Boureria huanita, 21
Brasso-Cattleya, growing a, 31
Bulb forcing, 1956, fall courses in, 104
Burnet, 65, *66*
Byzantine Snowdrop, 43, *44*

C

Camassia scilloides, *June cover*, 81
Carson, Meredith: Thyme, 78; The Lore of Mints, 101; The Lore of Basil, 105
Cedars, Red, habitats of, in Missouri, 12
Cheirostemon platanoides, *Feb. cover*
Chapultepec, gardens of, 21
Cheiranthodendron larreategui, *Feb. cover*, 23
Chervil, *74*, 75
Cocucci, Dr. Alfredo, 153
Córtes, Hernán, letters of, early reference to Mexican gardens, 18
Cupressus Lindleyi, 23
Cutak's "Cactus Guide," review of, 126
Cutler, H. C.: The Linnean House, 113
Cypresses in Mexican gardens, *20*, 27
Cypripedium parviflora, *37*

D

Daffodil, new pink, ROSE OF BRODY, 119, *119*
Davis, Dr. Edward, 153
Dendrobium Phalaenopsis, 135
Dicranum scoparium, 103
Dingeldein, Emily: Salad Burnet, 65
Dodson, Calaway H., 153
Drought in St. Louis area, 49
Duggar, Benjamin Minge, in memoriam, 114
Dwyer, Dr. John D.: The Missouri Botanical Garden Herbarium, 120

E

Eiten, George, 153
Eriogonum longifolium, 106
Etter, Alfred G.: How to use a river, Introduction, 81
Evergreen, new broadleaf, 32

F

Fern, Walking, *March back-cover*

Fish in Meramec River, 83
Fisher, Sir Ronald, 12
Fisher, Reka Neilson: The Savories, 73
Flowers for a fragrant pot pourri, 75

G

Galanthus byzantinus, 43, *44*; *elwesii*, 43; *nivalis*, 43, var. *scharlokii*, 43
Geddes' "Cities in Evolution," review of, 91
Giant City State Park in the spring, 33; dry sandstone bluffs at, *40*; rock slide along Stonefort Creek in, 34; quiet rocky stream at, *39*; trail between massive sandstone bluffs, *March cover*
Ginkgo, in the Garden, 110
Golden Seal, *16*
Granite and porphyry on the St. Francois range in the Ozarks, *8*
Grant and Grant's "Garden Design, Illustrated," review of, 90
Grass exhibit at the Garden, *96*
Gravel bar at a river's bend, *82*
Gravel run at Jack's Fork, *Nov. cover*
Green Five-leaved Orchid, 102
Growing an Orchid Plant, 31
Growing Orchids in the Home, course in, 145

H

Hall, Leonard: The Ozarks come back 129; and Leon Hornkohl: The Ozarks come back, 1
Hamamelis virginiana, 99, *98*; *vernalis*, 100
Hand-Flower Tree (Macpalxochiquahuitl), of the Aztecs, *Feb. cover*
Henry Shaw Christmas Party, 139
Herb vinegars, 72
Herbarium, of the Missouri Botanical Garden, 120
Herbs: and their uses, 65–80; Basil, *94*, 95, lore of, 105; Bergamot, 69; Borage, 80, *May cover*; Burnet, 65, *66*; Chervil, *74*, 75; European Horsemint, 69; for Pomanders, 77; for Pot Pourri, 75; Marjoram, 67; Mints, 69, lore of, 101; Oregano, 68; Pennyroyal, 69; Peppermint, 69; Rosemary, *71*; Savory, *79*; Spearmint, 69; Tarragon, 70; Thyme, 78, 93; medicinal, used by the ancient Mexicans, 18
Hernandez X., Ing. Efriam, 151
Holly, Balkan, 32
Horner, Nell C., book reviews: of John and Carol Grant's "Garden Design, Illustrated," 90; of Cutak's "Cactus Guide," 126
Hornkohl, Leon: The Ozarks come back, Leonard Hall and, 1
Horsemint, European, 69
Horticulture, courses in, 144
Hou, Dr. Ding, 153
Huaxtepec, gardens at, 21, 28
Hyacinth, native wild, *June cover*, 81
Hydrastis canadensis, 36

I

Ilex aquifolium var. *angustifolium*, 32
Illinois, Giant City State Park in, 33; map of southern, showing location of Giant City State Park, *38*
Iron chelates for azaleas, 51
Isotria medeoloides, 102; *verticillata*, 103

J

Jack's Fork in the Missouri Ozarks, *5*
Jones and Fuller's "Vascular Plants of Illinois," review of, 90

K

Kaplan, Dr. Lawrence, 153
Kidd, Dr. Harold, 153
Kieffer, Catherine: Tarragon, 70
Kohl, Paul A.: Azaleas for St. Louis Gardens, 49
Klippel, Allene K.: Basil, 95

L

Lady's Slipper, yellow, *37*
Ladies' Tresses, *117*
Langman, Dr. Ida K.: Botanical Gardens in Ancient Mexico, 16
Lawn grass in St. Louis, 96
Lawns, building and care of, 97
Lehmann, Anne L.: Growing an Orchid Plant, 31
Lespedeza, Korean, 124
Leucojum vernum, 45
Li's "Chinese Flower Arrangement," review of, 111
Linnean House, *Oct. cover*; history of, 113
Lippagator, Use in plant propagation, 142

M

Majorana hortensis, *67*, 68
Marjoram, Sweet, *67*
Menthas, 69
Meramec River: conservation of, 81; endless flow of gall in, *84*; trip of discovery on, 82
Mexico, botanical gardens in, 17
Mexico City and environs, view of, *18*
Meyer, Dr. F. G.: Balkan Holly, 32; Notes on Snowdrops, 43; review of Well's "Plant Propagation Practices," 14
Mikula, Dr. Bernard, 153
Mints, 69; lore of, 101
Missouri, Late October Flowers in, 116; rice in, 136; wild annuals and biennials of, 41; vegetation, 12
Missouri Botanical Garden: Chrysanthemum Show at the, 135; Grass exhibits at the, 96; Henry Shaw Christmas Party, 139; herbarium, 120; horticulture courses at the, 104, 144; Linnean House at the, 113; (Shaw's Garden), some facts about, 46; Third Annual Symposium of Systematics at the, 140
Missouri Ozarks, 1; cattle in, 4; changing plant successions in, 132; erosion in, *7*; farming in, 6; farm pond in, *Jan. cover*; fire control in, 9; forest management in, 134; forests, 4, 9; geology of, 2; lespedeza in, 125; logging in, 5; open range grazing in, 129; soils, 4
Missouri's crop of Wild Annuals and Biennials, 41

Missouri vegetation and an English Mathematician, 12
Moctezuma's gardens, 19
Mohlenbrock, Robert H.: Giant City State Park in the spring, 33
Montezuma's gardens, see Moctezuma
Moore, Dr. George T., Director 1913–1953, 141, *Dec. cover*
Muenscher's "Weeds," review of, 47

N

Native Plants, 41; rare, 102, 106
Nirodi, Dr. Nalini, 153
Notes, 151

O

Ocimum basilicum, 95; *minimum*, 95; *sanctum*, 95
October Flowers in Missouri, 116
Orchid plant, a few lines about an, 31
Orchids: growing in the home, course in, 145; Purple five-leaved, 102, *Sept. cover*
Oregano, 68
Origanum majorana, 67, 68; *vulgare*, 68
Osborn, Charlotte: Oregano, 68
Ozarks: Come Back, 1, 129; forest management in, 130; rehabilitation of, 129
Oryza sativa, 136

P

Pennyroyal, 69
Peppermint, 69
Pirone's "What's New in Gardening," review of, 88
Plant propagation, course in, 142; the lippagator method of, 142
Polygonatum canaliculatum, 37
Pomander, from an old woodcut, 80
Pomanders, 77
Poos, Kenneth A.: How to Use a River, 81
Pot pourri, flowers for a fragrant, 75
Publications, for sale at the Missouri Botanical Garden, *April back-cover*
Purple Five-leaved Orchid, 102, *103*; *Sept. cover*
Putzel, Henry, 152

R

Rao, Dr. A. S., 153
Rare Plants, in Missouri, 102, 106
Recreational value of Meramec River, 85
Rhododendron calendulacem, 60; *mucronatum*, 59, 60; cuttings, *59*, var. *ripense*, 60; *mucronulatum* (Korean), *52*, 53, 59; *nudiflorum*, 60; *obtusum amoenum*, 59; *roseum*, 60; *Schlippenbachii*, 59; *Vaseyi*, 60
Rice, cultivation of in Missouri, 136
River, how to use a, 81
Rose Pink, 42
Rosemary, 71
Rosendahl's "Trees and Shrubs of the Upper Midwest, review of, 123

S

Sabatia angularis, 42
St. Francois range, granite and porphyry on the, *6*
St. Louis: climate, 49; gardens, azaleas for, 49
St. Louis Herb Society, Herbs and their uses, 67–80, 93–96
Saintpaulia, 137
Salad Burnet, 65, *66*
Satureia hortensis, 73; *montana*, 73
Savories, 75
Savory, 79
Schemm, Emilie: Chervil, 75
Schreiber, Virginia: Sweet Marjoram, 67
Scott, W. F., review of Watkins' "ABC of Orchid Growing," 127
Sewage in Meramec River, 84, *84*
Shaw, Henry, personal memories of, 146
Snowdrops, notes on, 43
Soil, for azaleas, 51
Solomon's Seal, 37
Spearmint, 69
Spring Garden Tour, 47
Steyermark, Dr. Julian A.: Eastern Witch Hazel, 99; Late October Flowers in Missouri, 116; Missouri's crop of wild annuals and biennials, 41; Rare Missouri Plants, 102, 106; Rice, Northward Ho!, 136
Synandra hispidula, *36*
Systematics, Third Annual Symposium on, 140

T

Tarragon, 70
Taxodium distichum, 109; *mucronatum*, *20*, *23*
Tetzcotzingo, gardens at, 27, 28
Thyme, 78, 93
Tour for the benefit of the Garden, 47
Tretter, Adele: An African Violet Society is Born—The African Violet Society of America, Inc., 137; the Metropolitan St. Louis Council of African Violet Clubs, 138
Tryon, Dr. Alice F., 153; A Matter of the Mints, 69; Review of Jones and Fuller's "Vascular Plants of Illinois," 90; review of Muenscher's "Weeds," 47; review of Rosendahl's "Trees and shrubs of the Upper Midwest," 123
Tryon, Dr. Rolla, 153
Tutass, Helmut, 142

U

Umbrella Plant, 106, *107*

V

Villa Aldobrandina Tusculana, *152*
Vinegars, herb, 72; Lemon Thyme, 93

W

Walking Fern, *March back-cover*
Watkins, "ABC of Orchid Growing," 127
Wells' "Plant Propagation Practices," review of, 15
Whorled Pogonia, 102
Wild flowers, in Missouri, 41; annuals and biennials, 41; in Giant City State Park, 33
Witch Hazel, Eastern, 99; Vernal or Ozark, 100

X

Xolocotzi, Efriam Hernandez, 151

Z

Zizaniopsis miliacea, 136; *aquatica*, 137

BOARD OF TRUSTEES

John S. Lehmann, President
Daniel K. Catlin, Vice-President
Eugene Pettus, Second Vice-President
Leicester B. Faust
Dudley French
Henry Hitchcock
Richard J. Lockwood
Henry B. Pflager
A. Wessel Shapleigh
Robert Brookings Smith

EX-OFFICIO MEMBERS

Ethan A. H. Shepley,
Chancellor of Washington University
Arthur C. Lichtenberger,
Bishop of the Diocese of Missouri
Raymond R. Tucker,
Mayor of the City of St. Louis
James F. Morrell,
President of the Board of Education of St. Louis
Stratford Lee Morton,
President of the Academy of Science of St. Louis

Secretary
Oscar E. Glaessner

THE HORTICULTURAL COUNCIL

Clifford W. Benson, E. G. Cherbonnier, Robert E. Goetz, Paul Hale, Mrs. W. Warren Kirkbride, Mrs. Hazel Knapp, Emmet J. Layton, Francis McMath, D. O'Gorman, Robert W. Otto, Robert Walm, Harold E. Wolfe, John S. Lehmann, Edgar Anderson, G. W. Pennewill, Chairman.

STAFF

Edgar Anderson ..... Director
Hugh C. Cutler ..... Associate Director
Henry N. Andrews ..... Paleobotanist
Louis G. Brenner ..... Arborist and Grounds Superintendent
Ladislaus Cutak ..... Horticulturist and Greenhouse Superintendent
Hugh C. Cutler ..... Curator of the Museum
Carroll W. Dodge ..... Mycologist
John D. Dwyer ..... Research Associate
Robert J. Gillespie ..... In charge of Orchids
Oscar E. Glaessner ..... Business Manager
Nell C. Horner ..... Librarian and Editor
Paul A. Kohl ..... Floriculturist
Emmet J. Layton ..... Landscape Architect
Frederick G. Meyer ..... Dendrologist
Viktor Muehlenbachs ..... Research Associate
George H. Pring ..... Superintendent
Kenneth A. Smith ..... Engineer
Julian A. Steyermark ..... Honorary Research Associate
Alice F. Tryon ..... Research Associate
Rolla M. Tryon, Jr. ..... Assistant Curator of Herbarium
George B. Van Schaack ..... Acting Curator of Herbarium
Robert E. Woodson, Jr. ..... Senior Taxonomist

Office of publication: 306 E. Simmons Street, Galesburg, Illinois.
Editorial Office: Missouri Botanical Garden, 2315 Tower Grove Avenue, St. Louis 10, Missouri.
Published monthly except July and August by the Board of Trustees of the Missouri Botanical Garden. Subscription price: $2.50 a year.
Entered as second-class matter January 26, 1942, at the post-office at Galesburg, Illinois, under Act of March 3, 1879.

SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical Garden (the official name chosen by Mr. Shaw) carries on the garden established by Henry Shaw over a century ago at TOWER GROVE, his country home. It is a private institution and has no support from city or state. The old stone walls and cast-iron fences, the Linnaean House, the Museum, the Mausoleum, and the TOWER GROVE mansion all date from Mr. Shaw's time. Since his death, as directed in his will, the Garden has been in the hands of a Board of Trustees who appoint the Director.

The Garden is open every day in the year (except New Year's and Christmas) from nine A. M. until seven P. M. (spring to fall) and until six (in the winter time) though the greenhouses close at five. TOWER GROVE, itself, Mr. Shaw's old country home, is open from one until four, admission twenty-five cents, with special guides. The Garden is nearly a mile long and has several entrances. The Main Entrance, the one most used by the general public, is at Tower Grove and Flora Place on the Sarah bus line (No. 42). The Park Southhampton buses (No. 80), direct from downtown, pass within three blocks of this entrance and stop directly across the street from the Administration Building at 2315 Tower Grove Avenue. The latter is the best entrance for students, visiting scientists, etc. It is open to such visitors after 8:30 A. M., but is closed on Saturdays, Sundays, and holidays. The step-in gate (more or less concealed by the big Cleveland Ave. gate, 2221 Tower Grove) is nearly always open, and there is a service entrance on Alfred Avenue, one block south of Shaw Avenue.

RECEIVED
JAN 11 1957
FLORICULTURE

Since Mr. Shaw's time an Arboretum has been developed at Gray Summit, Mo., adjacent to State Highways 50 and 66. It is open every day in the year and has two miles of auto roads as well as foot trails through the wild-flower reservation. There is a pinetum and an extensive display of daffodils and other narcissi from March to early May.